

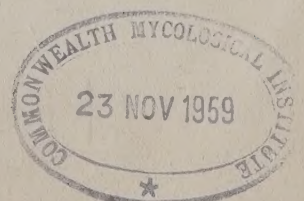
Meeting Report
No. 1955/8

REPORT OF THE
FOURTH FAO MEETING ON WHEAT AND BARLEY BREEDING IN THE NEAR EAST

Held in
Karachi, Pakistan
from
14-19 March 1955

Agriculture Division
Food and Agriculture Organization of the United Nations
April, 1955
Rome, Italy

FAO/55/4/2508



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INTRODUCTION

The Fourth Meeting of the Committee on Wheat and Barley Breeding in the Near East, convened by FAO at Karachi, 14-19 March 1955, by courtesy of the Government of Pakistan, was attended by delegates and advisers from Egypt, Iran, Jordan, Lebanon, Pakistan, Turkey and the United Kingdom. A list of the names and addresses of participants is attached.

Participants were welcomed on behalf of the Government of Pakistan by His Excellency the Minister of Agriculture, Mr. Ghyasuddin Pathan, and on behalf of the Director-General of FAO by Dr. R.A.Silow (FAO).

Mr. Muhammad Afzal (Pakistan) was unanimously elected Chairman and Professor O. Tosun (Turkey) Vice-Chairman.

Dr. G.A. Wiebe, Principal Agronomist in charge of Barley Investigations in the United States Department of Agriculture, was present as Consultant to FAO in Cereal Breeding.

Dr. R.A.Silow (FAO) acted as Technical Secretary.

PROGRESS IN WHEAT AND BARLEY BREEDING

A series of comprehensive reports was submitted by delegates on progress in wheat and barley breeding in their countries. In addition a report was transmitted from Syria. These led to extensive discussion, part of which is summarized under appropriate subject-matter headings below.

The reports indicated clearly that as a result of the opportunities for exchange of information, ideas and breeding material provided through this series of meetings, country programs had been stimulated in many ways.

As at the Third Meeting, the value was again brought out of National Committees on Wheat and Barley Breeding or equivalent coordinating bodies in encouraging desirable developments in national programs. Thus in Turkey the National Committee had recommended a revision in breeding and production policy, organized quality contests among growers and established wheat grain standards, and is giving consideration to barley grain standards and to seed certification standards. A Committee has now been established in Egypt which meets regularly and has undertaken similar activities, and one has been established and is active in Iran. In Pakistan the required functions are covered by the Food and Production Council, and in Cyprus provision is being made for the inclusion of breeding interests on the existent Grain Commission.

In Lebanon the Cereals Office in the Ministry of National Economy maintains close liaison with the Ministry of Agriculture in technical matters. A Committee has been established in Syria. In Jordan the requirements for an effective Committee are under active consideration. No Committee has yet been established in Iraq.

The Meeting again directed the attention of Governments to the desirability of giving the fullest possible encouragement to the activities of existent National Wheat and Barley Improvement Committees or equivalent coordinating bodies. Such technical coordination and advisory Committees may be established by administrative decision and do not require legislative action. The advantages of a formally constituted committee are that its advice in technical matters is likely to be sought and followed by Governments, and that it can itself initiate recommendations on desirable policy developments and action.

REPORT ON COOPERATIVE NURSERIES FOR THE SECOND SEASON, 1953-54

The Technical Secretary presented a summarized "Report on FAO Cooperative Uniform Near East Wheat and Barley Nurseries for the crop year 1953-54", which had been prepared by Mr. Y.T. Mao of the Agriculture Division of FAO on the basis of reports submitted from Cyprus, Egypt, Iran, Iraq, Jordan and Turkey. Reports from other countries within the region were not received in time for inclusion in the summary. Data received from India, Italy and Kenya were also included for comparative purposes.

This was only the second season in which the nurseries were grown and, as was realized when this project was initiated, observations during several additional seasons will be needed before definite conclusions can be drawn. However, many varieties continued to show resistance to local races of rust and bunt and appear to be promising for use as parental material in breeding programs in the region.

It was mentioned that the variety Valentine carries resistance to loose smut (Ustilago nuda (Jens.) Rostr.) closely linked to stem rust (Puccinia graminis Pers.) with about one per cent crossing-over.

The Technical Secretary pointed out that the value of the summary prepared by FAO was reduced for all participants if data arrived too late for inclusion and requested the cooperation of delegates in forwarding their reports as soon as possible after the end of each field season. If possible a summary statement on the results should be included in those reports.

CONTINUATION OF COOPERATIVE UNIFORM RUST AND BUNT NURSERIES

In view of the value of the nurseries not only in identifying resistant breeding stocks but also in providing information on the distribution and prevalence of races of the pathogens within the region, the Meeting recommended that all countries in the region continue to grow the wheat and barley nurseries for several additional seasons, on exactly the same lines as indicated in the report of the Third Meeting. More detailed suggestions regarding the method of inducing artificial infection are given below in this present report. As seed will not be available from FAO, countries should use that harvested from the current nurseries. In order to reduce the work load, duplicate varieties essentially the same in reaction, parental origin or gene content will be eliminated. A suggested list of varieties to be retained will be sent from FAO. Record forms will also be sent from FAO.

In the barley nurseries observations on covered smut and net blotch should be included in countries where these diseases are of importance.

CONTINUATION OF COOPERATIVE UNIFORM WHEAT AND BARLEY YIELD TRIALS

The Meeting recommended that all countries in the region continue the small scale wheat and barley yield trials of a limited number of selections from the rust and bunt observation nurseries which appear most promising from the agronomic standpoint. These should be organized on the same lines as suggested in the report of the Third Meeting, extending the trials, as seed and facilities permit, to other centres representative of the major regional conditions within the country, and advancing the most promising entries to larger-scale trials.

Although FAO had, by request of the Committee, supplied details of suitable lay-outs, it was agreed that countries could adopt any efficient lay-out which they preferred. It was also agreed that in order to facilitate comparison of data from the various countries, all yields should be reported in metric tonnes per hectare.

Seed for these trials is not available in FAO. For all varieties, including the controls, countries should use seed harvested from the current trials.

COOPERATIVE RUST SURVEY

The Egyptian delegation presented a further report on work conducted in Egypt in 1954 on the identification of races of wheat stem rust from Egypt, Syria and Jordan.

The stem rust races so far isolated in the Near East region are shown in the following table. Entries for Egypt, Syria, Jordan, Cyprus and Turkey are based on work conducted at the Egyptian Rust Laboratory at Giza, whilst the data for the Indo-Pakistan sub-continent are derived from records included in a paper submitted by the Pakistan delegation.

EGYPT	SYRIA	JORDAN	CYPRUS	TURKEY	INDO-PAKISTAN SUB-CONTINENT
9					
	11			11	
14	14	14		14	
					15
17	17	17	17		
19	19	19	19		
21	21	21		21	21
24	24	24		24	24
	34			34	34
	39				
					40
42					42
53	53			53	
53A					
59					
69					
					75
88					
					117
	122			122	
123					
					194
E.1					

The common races of wheat stem rust in the Near East at the present time are races 14,17,19,21 and 24, and the other races listed in the above table are of minor importance.

It was reported that further glass-house accommodation for this work was being provided in Egypt and Pakistan. In view of the desirability that race identification and the testing of seedling resistance of varieties be conducted in each country, the Meeting recommended that governments improve the laboratory and greenhouse facilities for pathological studies in their countries without delay, and that special attention also be given to the training of additional plant pathologists, especially in connection with rust research.

THE TECHNIQUES OF TESTING FOR RESISTANCE TO SPECIFIC DISEASES AND PESTS

In response to enquiries concerning methods of inducing epiphytotics and adequate pest infestation for the testing of breeding material, the following procedures were recommended:-

Net Blotch (*Helminthosporium teres*. Sacc.) in barley: In California the method adopted is to sow early (in October) and spread infected straw and leaves from the previous crop. "Spreader" border and check rows of a susceptible variety are used to initiate and continue the epidemic. In dry areas the plots should be sprayed with water to hasten development.

Wheat and barley rusts: Two or three weeks ahead of the planting of the varieties under test, border and check rows should be seeded with a mixture of varieties (say 2 or 3 in number) highly susceptible to the races prevalent in the region, and of different maturity dates. In the case of autumn-sown tests, special attention should be given to the inclusion amongst the susceptible varieties in the spreader rows of at least one particularly early variety, and where dry these rows should be irrigated immediately after sowing. An irrigation schedule should be commenced at the time the first pustules appear, in order to maintain high humidity. It has been observed that the amount of inoculum is increased by removing spikes from the spreader rows when fully headed.

The above procedure is recommended for use under natural infection conditions. When an artificial epidemic is to be established, the border and check rows should preferably be inoculated hypodermically, or alternatively sprayed with a spore suspension at or shortly after the shooting stage, using a mixture of races present in the area. This should be done immediately after an injection, on warm days.

Bunt (*Tilletia* spp.) and Flag Smut (*Urocystis tritici* Koern.) of wheat: As inoculum use a mixture of spores from all races identified. In the absence of race identification use smutted heads from different varieties collected from the previous crop at various locations. Infection of seeds should be carried out at least two days before sowing at the rate of 5 grammes per one kilogramme of seeds. Application of spores should be carried out in envelopes which should be thoroughly shaken to ensure spread and adhesion of spores to all seeds. Where an adequate supply of spores is available,

plot infestation may be carried out by covering the seeds with a thin layer of soil into which spores have been mixed, and then covering this layer with ordinary soil. Seeds should be sown after the normal date of sowing, when the soil temperature is 12-15°C. in the case of bunt or 15-20°C. in the case of flag smut. The soil should be of medium moisture content, with no free moisture but very slightly above the optimum for seed germination. Seed should be sown at a depth of 5-7 cms., and water should preferably not be applied until the seedlings have emerged.

Covered Smut (*Ustilago hordei* (Pers.) Lagerh.) of barley: For this disease the same procedure should be adopted as in the above paragraph, except that seed infection should be carried out by dipping the seeds in a spore suspension in a desiccator and the air exhausted by an exhaust pump; seed should be sown when the soil temperature is 15-20°C.

Hessian fly in wheat and barley: Varieties resistant to hessian fly exist in both wheat and barley. These could be obtained by writing to Dr. G.A. Wiebe, Plant Industry Station, United States Department of Agriculture, Beltsville, Maryland, U.S.A. In wheat 4-5 genes have been identified, and two in barley. In the case of wheat these genes determine resistance to different races of the fly. Greenhouse and field techniques for causing infestation have been developed. Particulars could be obtained from Mr. W.B. Cartwright, C/o Department of Botany, Purdue University, Lafayette, Ind., U.S.A.

BREEDING FOR QUALITY IN WHEAT

A paper on "Problems in Breeding for Quality in Wheat" was presented to the meeting by Dr. P.F. Pelshenke. This gave rise to much discussion on the relative importance of varietal characteristics and environmental factors in determining quality, from which it was clear that a much more precise evaluation of the relative contributions of genotype and environment to quality in wheat is urgently needed.

Emphasis was also given to the need for study of quality in relation to local bread requirements, with a view to the definition of breeding aims for wheat for local consumption, which are different from those for wheat intended for manufactured bread or for export.

As wheat is the most important food crop of the Near East countries and the breeding of bread wheats of high nutritive value can be accomplished only when information is available on the quality of parental material and hybrid selections, the Meeting recommended that Governments provide with the least possible delay at least the minimum laboratory facilities, equipment and personnel needed for small-scale quality testing of breeding material. Where trained technical help is not available, a short three-month course of training adequate for the purposes of this initial program could be obtained at a wheat technology laboratory in a neighbouring country.

The minimum tests required are as follows:-

- (1) Protein or gluten content; and
- (2) Gluten quality, for which the recommended methods are:-
 - (a) Swelling method;
 - (b) Zelany test;
 - (c) Dough-ball test.

The equipment needed for the above minimum tests is not likely to cost more than about 1,200 to 1,500 dollars.

Where fuller tests on quality are desired the following additional tests are suggested:-

- (1) Experimental milling tests, using one of the following recommended mills: (a) Allis Chalmers (USA); (b) Buhler (Switzerland); (c) Miag (Germany).
- (2) Experimental baking tests, for which recommended ovens are: (a) a local oven to test locally made breads; (b) National Manufacturing Co. (U.S.A.).
- (3) Dough tests, for which one of the following machines is recommended: (a) Farinograph; (b) Alveograph; (c) Recording Mixer; (d) Water absorption meter.

It is recommended that where Governments find it impossible to provide even the minimum requirements for testing, the assistance of wheat laboratories in other countries within the region be sought with a view to obtaining tests on at least the most promising hybrid selections.

It was also suggested that where information is needed on sources where testing equipment can be purchased enquiries be directed to Dr. P.F. Pelshenke, Grain Laboratory, Chemical Section, Ministry of Agriculture, Cairo, Egypt.*

* Footnote: The attention of delegates is directed to a recently published bulletin entitled "A review of methods of determining the quality of wheat and flour for breadmaking" by B.S. Miller and J.A. Johnson (Technical Bulletin No. 76 of the Agricultural Experiment Station, Kansas State College of Agriculture and Applied Science, Manhattan, Kansas, U.S.A., published April 1954). - Secretary.

THE IMPORTANCE OF DROUGHT TOLERANCE STUDIES

The Meeting again directed attention to the importance of drought tolerance studies and re-affirmed its earlier recommendations that the Cooperative Uniform Wheat and Barley Nurseries be grown under marginal rainfall conditions as Drought Observation Nurseries in those countries where the necessary personnel and facilities are available.

MISCELLANEOUS TECHNICAL DISCUSSIONS

The Meeting was characterized by particularly lively discussion over a wide range of topics related to cereal breeding and production in the region. The following were amongst the more important subjects of general interest.

Sources of breeding stocks derived from timopheevi crosses . Material derived from crosses with Triticum timopheevi is of particular interest from the standpoint of disease resistance. Dr. R.G. Shands of Wisconsin has some favourable material of vulgare type. Delegates could obtain material by writing direct to Dr. Shands at Department of Agronomy, University of Wisconsin, Madison, Wisc., U.S.A.

Sources of disease resistance. The attention of delegates was directed to a reprint of an article in the United States Department of Agriculture Year Book for 1953 (pp. 192-216; Separate No.2421) by F.J. Stevenson and H.A. Jones entitled "Some Sources of Resistance in Crop Plants", which lists varietal sources of disease resistance in wheat and barley.

Control of leaf miner. The delegate of the United Kingdom (Cyprus) offered to make available on request details of the mode of application and quantities used of D.D.T. and B.E.C., which had been found successful in controlling leaf miner in Cyprus.

General adaptability of Californian barleys in countries with Mediterranean climate. Dr. Wiebe commented on the general adaptability of Californian barleys under Mediterranean climatic conditions and offered to arrange for varieties and selections from California, including early material, to be made available to delegates. Requests should be addressed to Dr. Wiebe at Beltsville.

The World Collection of Barley. The World Collection of Barley Varieties, made available through the generosity of the United States Department of Agriculture to countries in the Near East region, was last year grown in Egypt, which country has now in its turn kindly provided seed of the entire collection to Turkey. Other countries requiring this material should write direct to either Mr. A.B. Hasan, Plant Breeding Section, Ministry of Agriculture, Giza, Egypt, or Mr. Ekrem Günay, Ziraat Vekâleti, Birinci Sube Müdürü, Ankara, Turkey.

Breeding for lodging resistance. Dr. Wiebe referred to a technique recently developed by Dr. J.E. Grayfius of Michigan State College for obtaining a metric estimate of straw strength using a link chain. A full account of the method is given in an article published in the Agronomy Journal, 1953 or 1954. Reference was also made to the parental value of Norin wheats obtained from Japan, which possess a short stiff straw yet have long spikes with normal sized seeds. Inheritance of height is conditioned by relatively few genes, thus permitting the selection of derivatives of various intermediate heights. These wheats are apparently susceptible to many diseases but this should not preclude their use as sources of stiff straw.

Classification of Wheat Varieties. Attention was directed to a recent publication (March, 1954) by the late B.B. Bayles and J. Allen Clark, entitled "The Classification of Wheat Varieties grown in the United States in 1949" (Technical Bulletin No. 1083 of the United States Department of Agriculture), which is available on request to Dr. Wiebe at Beltsville.

Cytogenetics of Barley. Reference was made to a reprint of the articles on the cytogenetics of barley by the late Dr. Luther Smith, which appeared in Botanical Reviews. Copies of the reprint may be obtained on request from the Department of Agronomy, Washington State College, Pullman, Washington, U.S.A.

PROBLEMS AND METHODS OF BARLEY BREEDING

A comprehensive survey of problems and methods of barley breeding in America delivered by Dr. G.A. Wiebe was much appreciated by delegates and led to extensive discussion, which centred particularly around the use of male sterility and isogenic lines as applied to practical plant breeding problems.

THE IMPORTANCE OF MECHANICAL AIDS IN CEREAL BREEDING

The Meeting had before it a paper on the importance of mechanical aids in wheat breeding, together with a list of references, submitted by the Pakistan delegation. Such aids include miniature threshers and cleaners, small seed drills, and other equipment to facilitate the efficient handling and testing of large numbers of small samples. Dr. Wiebe described useful types of equipment available at reasonable cost in the United States, including a larger thresher suitable for row-row material, a smaller thresher for single heads, and a re-cleaner for seed.

FAO was requested to give consideration to the possibility of making specimens of suitable equipment available to countries, to serve as samples which could be copied locally. The Technical Secretary mentioned that the provision of advice and assistance in such matters would be an appropriate function of the proposed regional consultant in cereal breeding.

The Meeting emphasized the great importance of mechanical aids in enabling cereal breeders to survey and evaluate their breeding material on the scale that is essential if their programs are to be successful, and recommended that governments give the fullest possible consideration to the provision of all necessary equipment.

SEED PRODUCTION, CERTIFICATION AND DISTRIBUTION

The Meeting considered a paper on "The Production, Certification and Distribution of Cereal Seed" prepared by Mr. A. Kjaer, Seed Production Specialist of FAO. The Meeting expressed its firm conviction that a satisfactory seed certification scheme must include provision for adequate field inspection, and recommended that the seed production and certification services be strengthened throughout the region.

The Meeting requested that consideration of uniform minimum seed certification standards for wheat and barley in the Near East region be included in the agenda of its next meeting, with a view to arriving at agreement on a set of uniform minimum requirements that would be acceptable to all participating countries. The Technical Secretary offered to distribute to all countries in the near future a copy of the Uniform Minimum Seed Certification Standards of the International Crop Improvement Association which are in operation in the United States of America and Canada, to serve as a basis for the preparation by delegates of modified standards suitable for use in their own countries, for presentation and discussion at the next meeting.

It was pointed out that FAO is in a position, under the Expanded Technical Assistance Program (ETAP), to provide for the service of experts to assist countries in the establishment of seed certification schemes or in the improvement of existing schemes which are considered inadequate. Such assistance would include the training of local personnel in seed certification procedures, so as to enable the work to be continued after the expert has left the country. Countries in the region might wish to examine their position as regards certification of cereal seed, and if technical assistance is found desirable, an official request for such assistance could be submitted to FAO through the established governmental channels.

TRAINING CENTRE ON CEREAL BREEDING

The Technical Secretary reported that owing to procedural requirements, it had not been possible to make arrangements for the projected Training Centre on Cereal Breeding in the Near East to be organized as early as had been hoped, and that it now appeared unlikely that it could be held before January-March 1957.

It was reported that the Egyptian Ministry of Agriculture's laboratory in Cairo could receive visitors for short periods of training in the techniques of rust race identification and seedling reaction, and it was suggested that countries wishing to avail themselves of this generous offer should make arrangements direct with the Egyptian authorities.

REGIONAL CONSULTANT ON WHEAT AND BARLEY
BREEDING IN THE NEAR EAST

The Technical Secretary reported that difficulties had been encountered in the recruitment of a regional consultant on wheat and barley breeding, but that it was believed that the appointment would be in operation within the next few months.

SURVEY OF WHEAT AND BARLEY PRODUCTION IN NEAR EAST COUNTRIES

The Meeting recommended that each country prepare a brief account of the major features of the wheat and barley production in their countries, for submission to the next meeting.

Information should be supplied wherever possible under the following headings:

1. Averages for the three crop years, 1952/3, 1953/4, and 1954/5 of the area sown to each crop (hectares), production (metric tonnes) and yield (metric tonnes per hectare).
2. Maps showing topography, maximum, minimum and average temperatures (month by month), rainfall, relative humidity, direction and velocity of all winds throughout the year and particularly during the growing season, irrigated areas, and areas usually affected by diseases.
3. Dot map showing producing areas of wheat and barley (indicate whether these dots represent winter or spring varieties).
4. List of major varieties cultivated, in order of popularity, with approximate area (hectares) and very brief description of chief characteristics (including quality, adaptation to different climatic and soil conditions, and whether suitable for rainfed, flood-water or normal irrigation conditions). Give dot map showing varietal distribution where this information is available.
5. Describe cultural practices commonly used in grain production including:
 - (a) Growing seasons, dates of seeding and harvesting.
 - (b) Crop rotations.
 - (c) Methods of seedbed preparation, rates of seeding and methods of seeding.

- (d) Irrigation practices.
 - (e) Fertilizers used and rates and times of application.
6. List of major wheat and barley diseases and insect pests prevalent in the country with a brief statement on the importance of each.
7. Status of present improvement program:
- (a) Breeding for disease resistance, including list of resistant parents used.
 - (b) Breeding for yield, straw strength and other agronomic characters.
 - (c) Methods of producing foundation seed and of seed distribution and certification.
 - (d) Promising parents with important agronomic characters.
8. List of research workers and locations where work is underway.

Statements should not exceed about 15 pages in length.

It is realised that the preparation of such a survey will involve a considerable amount of work, but in addition to bringing together a great deal of information that will be of value to workers in the region as a whole, it will provide a bench-mark for the evaluation of future progress in national breeding programs and the fullest possible attention should be given to this proposal.

It is suggested that in each country an individual should be nominated to take charge of the compilation of this information, and that work should be started on it immediately so that it will be ready for presentation at the next meeting. In order to reduce the work load, the officer nominated might seek the assistance of colleagues and other sources of information, through the National Committee on Wheat and Barley Improvement or the National FAO Committee in his country.

TIME AND PLACE OF NEXT MEETING

The delegate of Iran submitted on behalf of his Government an invitation for the next meeting to be held in Teheran. This was received with appreciation by the Meeting. The Technical Secretary reported that as a matter of policy FAO had found it desirable to schedule such meetings as these on a biennial basis, in order to permit extension of FAO activities into other fields requested by member governments. On this basis the next meeting would be held in 1957.

Whilst some delegates expressed agreement with this suggestion, there was a strong sentiment in favour of a meeting in 1956, it being pointed out that this series of meetings was still in its early formative stages, that important new topics such as the need for uniform seed certification standards for cereals in the region had been raised for the first time at the current meeting and would require further early action, and that much would be lost in continuity and impetus if there was a two-year break between meetings at this early stage. It was agreed that a decision on the year in which the next meeting would be held would be left to FAO. The most suitable period for the meeting to be held in Teheran would be at the end of April or early in May.

PAPERS PRESENTED TO THE MEETING

Country Reports

- | | |
|-------------------------|---|
| EGYPT | Progress on Wheat Breeding in Egypt 1954/55 - A.F.M. El-Sayed, S.M. Dessouky, M.M. Hakam, Egypt |
| IRAN | Progress on Barley Breeding in Egypt - A.B. Hasan, Egypt
Report on Progress in Wheat and Barley Breeding in Iran - H.A. Shaybani, Iran |
| JORDAN | Brief Report on the Progress of Wheat and Barley Breeding in Jordan. |
| LEBANON | Rapport General:
(1) Compte-Rendu des Travaux de Recherche sur l'amélioration du blé et de l'orge 1953/54
(2) Rapport Succinct sur les Travaux de Recherches sur l'amélioration du blé et de l'orge 1954/55.
(3) Travaux Divers. |
| PAKISTAN | History of Wheat Improvement in Baluchistan - Obedur Rahman Khan and Habibur Rahman Khan, Pakistan
History of Wheat Improvement in North West Frontier Province - M. Sulyman, Pakistan.
Wheat Improvement in the Punjab - Abdur Rashid Khan and M. Ata Ullah Khan, Pakistan.
Wheat Breeding in Sind - A.R. Akhtar and A.R. Memon, Pakistan
Facts about Crop Yields in Pakistan - Guy W. Miller and M. Shafi Niaz, Pakistan.
Wheat Situation, November 1953 - Ministry of Food and Agriculture, Pakistan
Wheat Situation, August 1954 - Ministry of Food and Agriculture, Pakistan |
| SYRIA | Report on Cereal Breeding in Syria - Ministry of Agriculture, Syria |
| TURKEY | Activities of National Committee of Turkey on Wheat and Barley Breeding, 1953/54.
Annual Report 1952/53 - Institute for Agricultural Research, Turkey. |
| UNITED KINGDOM (CYPRUS) | Progress Report on the Wheat and Barley Improvement Program in Cyprus conducted by the Department of Agriculture - J.C.Parisinos, Cyprus. |

Reports on Nurseries 1953/54

Report on FAO Cooperative Uniform Near East Wheat and Barley Nurseries for the Crop Year 1953/54 - FAO

Observations on Cooperative Uniform Rust Nurseries in 1953/54 and on Yield Trials and Rust Nurseries 1955, in Jordan - M.H. Salim, Jordan

Wheat Rusts Nursery Records for the year 1953-54 at Lyallpur, Quetta and Peshawar (West Pakistan)

Barley Rust Nursery Record, North West Frontier Province, Pakistan

Observations of Turkey on Cooperative Uniform Wheat and Barley Nurseries, 1953/54

Seed Multiplication and Distribution Programs

Production, Certification and Distribution of Cereal Seed - FAO

A report on Seed Distribution and Seed Certification Programs in Cereals - M.C. Amirshahi, Iran

Pure Seed (Wheat) Multiplication in Sind - A.R. Akhtar and A.R. Memon, Pakistan

Diseases and Pests

Physiologic Races of Wheat Stem Rust in the Near East - Taufik Abdel Hak, Egypt

Wheat Rusts in West Pakistan - Abdus Sattar and Abdul Hafiz, Pakistan

Aerial Spraying Trials Conducted against Rusts of Wheat - Taskhir Ahmad and Abdul Hafiz - Pakistan

Plant Diseases in Relation to Improvement of Wheat in Pakistan - Abdul Ghafoor Kauser, Pakistan

Reaction of Wheat to Diseases Prevalent in Baluchistan - Saied Ahmad Malik, Pakistan

Reaction of Wheat Varieties to Physiologic Races of Stem Rust in Egypt - Tewfik Abdel-Hak, Egypt

Reaction of Newly Developed Lines and of some Varieties of the World Wheat Collection to Stem and Leaf Rusts - A. El Said, T. Abdel Hak, S. Desouki and M. Hakam, Egypt.

Reaction of World Wheat Collection to Rusts at the Agricultural Research Station, Tarnab (North West Frontier Province) - Mohd Sarwar Khan and Mohd Sulyman Khan, Pakistan

Relative Resistance of Wheat Varieties to Bunt and Flag Smut -
Tewfik Abdel-Hak, Egypt.

Reaction of Local Wheats to Flag Smut, -Abdul Hafiz, Pakistan

Studies of Septoria Leaf Spot Disease of Wheat - Abdul Ghani Arif,
Pakistan

Relative Resistance of Barley Varieties to Physiologic Races of
Stem Rust, Covered Smut and Net Blotch - Tewfik Abdel-Hak,
Egypt

Chemical Seed Treatments for the Control of Wheat and Barley Smuts
in Egypt - Tewfik Abdel-Hak, Egypt

Seed Treatment for the Control of Seed-Borne Diseases of Wheat and
Barley in Pakistan - Abdul Ghafoor Kauser,
Pakistan

Miscellaneous

Problems and Methods of Barley Breeding in America - G.A. Wiebe,
Principal Agronomist in Charge of Barley Investigations, USDA,
Beltsville, Maryland, USA; Consultant to FAO in Cereal Breeding.

Problems in Breeding for Quality in Wheat - P.F. Pelshenke, FAO Wheat
Technologist in Egypt, Ministry of Agriculture, Chemical Section,
Grain Laboratory, Cairo, Egypt.

Importance of Mechanical Aids in Wheat Breeding and List of Relevant
References - Obedur Rahman Khan, Pakistan.

Inheritance of some Spike and Grain Characters in Wheat in the
Punjab - Abdur Rashid Khan, Muhammad Arshad and Shamshad Akhtar
Khan, Pakistan

Crop Estimation Surveys on Wheat in the Punjab - D.M. Qureshi, Pakistan

Research Work on Manuring of Wheat in Sind carried out at the Agricul-
tural Research Station, Sakrand, Sind - M.M. Siddiki, Pakistan

The Taxonomic Status of the Egyptian Wheat, Triticum pyramidale Perc. -
H.A. Tobgy and A.H. Tobgy, Egypt.

FAO Services to Plant Breeders

World Catalogue of Genetic Stocks - Wheat, Supplement No. 4 - FAO

World List of Wheat Breeders and Breeding Stations - FAO.

LIST OF PARTICIPANTS

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